

The Effect of Direction of Comparison on the Selection of Causal Explanations

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Subjects in three experiments were asked to provide a causal explanation for the difference or deviation between an undesirable occurrence (e.g., an individual's recent illness) and a contrasting desirable occurrence (e.g., another individual's concurrent state of good health). Experiments 1 and 2 were conducted to assess the effect of direction of comparison between occurrences on the selection of causal explanations (based on a distinctive feature of the undesirable occurrence versus a distinctive feature of the desirable occurrence). Direction of comparison was manipulated by changing the order in which information about occurrences was presented (undesirable occurrence first versus desirable occurrence first) and by varying whether subjects reviewed information on occurrences with the causal question in mind (Experiment 1) or the question was specified after the fact (Experiment 2). Results indicate that when the causal question was specified in advance, subjects were more likely to base their explanations on distinctive features of the occurrence presented first. By contrast, when the causal question was specified after the fact, subjects were more likely to base their explanations on distinctive features of the occurrence presented second. Results for Experiments 1 and 2 are consistent with findings by Agostinelli, Sherman, Fazio, and Hearst (1986) on the detection and identification of change in two sequentially presented stimuli. In addition, the results of Experiment 3 indicate that differences in subjects' explanations cannot be accounted for by the alternative hypothesis that subjects limited their search to features of one occurrence or the other depending on the position of the causal question. Data show that when subjects were forced to limit their search to just one occurrence, they were more likely to base their explanations on common features that were judged a priori to be highly relevant to the event rather than on distinctive features of lesser causal relevance. © 1990 Academic Press, Inc.

The explanations people offer for occurrences represent important political and social judgments. For example, the explanations people

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provide for the stock market "crash" of 1987 may influence a wide range of behaviors including future investment policies and preferences for political candidates. The explanations people provide for occurrences in their private lives may also be an important influence on subsequent behavior (cf. Weiner, 1985, 1986). For example, an individual who attributes a severe cold to smoking cigarettes might decide to quit the habit. By contrast, an individual who explains his illness by noting that he had become run-down just prior to falling ill might continue to smoke but also make a point of getting more rest.

Despite the importance of these judgments, research suggests that preferences for causal explanations may be sensitive to subtle changes in how people represent the to-be-explained event (Hesslow, 1983; Mackie, 1965, 1974; van Fraassen, 1980). For example, recent studies indicate that people may seek causal explanations by comparing the target episode (e.g., an individual's severe cold) to a contrasting causal background (e.g., the same individual's prior state of good health (Einhorn & Hogarth, 1983, 1986; Hastie, 1984; McGill, 1989). According to this view, causal explanations are identified through a process of feature matching (cf. Tversky, 1977). Individuals are assumed to scan the feature space associated with the target episode and contrasting background. Features common to both are discarded because they don't account for the difference or deviation between the two occurrences. Rather, distinctive features—i.e., features present in the target episode but absent in the contrasting background, or vice versa—form the bases for causal explanations. Thus, if an individual who has smoked for years were to compare a recent illness to his prior state of good health he might identify a recent event, for example, having become run-down, as a possible causal explanation for the illness. He would not identify his smoking habit as a possible explanation because it is common to the target episode and the contrasting background.

Central to this view of causal reasoning is the hypothesis that the set of distinctive features and, hence, potential causal explanations, may change when the target episode is compared to different causal backgrounds (Einhorn & Hogarth, 1983, 1986; Mackie, 1965; 1974; McGill, 1989). Thus, individuals who have in mind the same target episode but different contrasting backgrounds may generate different causal explanations. For example, imagine that another individual were to compare the sick man to the man's roommate who was also run-down but who had remained in good health. Imagine also that the roommate does not smoke. In this case, being run-down is not a good explanation because it is common to the target episode and the contrasting background. Rather, a distinguishing feature of the sick man—for example, that he smokes—would be a more suitable explanation for the illness.

DIRECTION OF COMPARISON

While previous research demonstrates the disagreements on the causal explanation for an occurrence may derive from the selection of different causal backgrounds (Einhorn & Hogarth, 1983; McGill, 1989), the present research examines the effect of direction of comparison between the target episode and the contrasting background on the selection of causal explanations. Research on judgments of similarity (Tversky, 1977) and on the detection and identification of change (Agostinelli, Sherman, Fazio, and Hearst, 1986) indicates that direction of comparison may affect people's judgments by altering their sensitivity to distinctive features of one stimulus versus another. These findings suggest that the direction of comparison between the target episode and the contrasting causal background may also affect people's preferences for causal explanations. Thus, two individuals may have in mind the same target episode and contrasting background instance but, by reversing the direction of comparison between occurrences, may generate different causal explanations.

Research by Agostinelli, Sherman, Fazio, and Hearst (1986) on the process of detecting and identifying change in two sequentially presented stimuli suggests how direction of comparison may affect the selection of causal explanations. Agostinelli et al. (1986) use Tversky's (1977) model of the comparison process involved in judgments of similarity as a basis for understanding how people recognize change. According to Tversky's model, people perceive the degree of similarity between two objects S and R as the weighted linear combination of features that belong to S and R, features that belong to S but not R (i.e., distinctive features of S), and features that belong to R but not S (i.e., distinctive features of R). Influence of direction of comparison is reflected in the weight applied to distinctive features of S versus R. Tversky demonstrates that distinctive features of the object that is the focus of the comparison receive greater weight in the assessment of similarity. For example, if S is compared to R—as in the question, "How similar is S to R?"—distinctive features of S receive greater weight. If R is compared to S—as in the question, "How similar is R to S?"—distinctive features of R receive greater weight.

Agostinelli et al. posit a similarly asymmetric process for identifying changes in stimuli. These authors suggest that individuals focus on features of one stimulus and look for these features in the other. Direction of comparison mediates the nature of the changes (additions versus deletions) identified. Agostinelli et al. find that if the first stimulus presented is the focus of the comparison, individuals are more likely to notice deletions in the second stimulus (i.e., distinctive features of the first stimulus). By contrast, if the second stimulus is the focus of the com-

parison, individuals are more likely to notice additions in the second stimulus (i.e. distinctive features of the second stimulus). Thus, identification of change favors distinctive features of the stimulus that is the focus of the comparison.

Experiments presented by Agostinelli et al. demonstrate that direction of comparison may be influenced by experimental manipulations that are independent of the stimuli to be compared. Specifically, studies suggest that whether subjects anticipate the subsequent recognition task affects which stimulus is the focus of the comparison. Agostinelli et al. report that subjects who anticipate the recognition task focus on features of the first stimulus and compare these to the second, thereby noting a greater number of deletions. Subjects who do not anticipate the subsequent recognition task focus on features of the second stimulus and compare these to the first, thereby noting a greater number of additions.

Agostinelli et al.'s findings suggest that the selection of a causal explanation may depend on whether the causal question is posed before information on the target episode and contrasting background is presented or whether the causal question is posed after the fact. Specifically, Agostinelli et al.'s findings imply that if the causal question is posed first, individuals are more likely to base their explanations on distinctive features of the initially presented stimulus. However, if the causal question is presented after the fact, individuals are more likely to base their explanations on distinctive features of the occurrence presented second.

The following experiments were designed to test this hypothesis by manipulating the order of presentation of contrasting occurrences and examining differences in causal explanations (based on distinctive features of the first versus second occurrence). In Experiment 1, subjects were presented the causal question before being asked to review information on the target episode and contrasting background. Subjects in Experiment 1 were therefore expected to base their explanations on distinctive features of the occurrence presented first. By contrast, subjects in Experiment 2 were presented the causal question after being asked to review information on the target episode and contrasting background. Subjects in Experiment 2 were therefore expected to base their explanations on distinctive features of the occurrence that was presented second.

EXPERIMENT 1

Method

Subjects. Subjects were 36 New York University undergraduates enrolled in an introductory marketing course. The experiment was run in class.

Stimuli. The stimuli involved two written scenarios, each of which described a difference or deviation between a target episode and a contrasting causal background. The "illness" scenario described two college roommates, one of whom developed a severe cold (the

"undesirable occurrence") while the other remained healthy throughout the semester (the "desirable occurrence"). The "ointment" scenario described two brands of ointment that were left on a hot radiator overnight, one of which produced a burning sensation when later applied to the skin (the undesirable occurrence) while the other performed satisfactorily (the desirable occurrence). Information for each scenario was presented over three pages. The first page outlined the to-be-explained event. For each scenario, the undesirable occurrence was set up as the target episode and the desirable occurrence was set up as the contrasting causal background. For example, the first page for the illness scenario described the to-be-explained event as follows:

Harry Wilson came down with a severe cold about two weeks after the semester started. The cold lingered and Harry is behind in most of his classes. Harry's roommate Tom, on the other hand, did not get sick at all. Harry would like to know what caused him to get so sick.

The second and third pages presented information about the desirable and undesirable occurrences, respectively. For example, for the illness scenario, subjects were presented the following paragraph of information about the undesirable occurrence:

Harry is a junior economics major who hopes to go to law school someday. He works hard but has a decent social life. He occasionally stays out late and has trouble getting up for classes. Harry lives in a dorm and eats most of his meals at the student center. His diet is fairly well-balanced. Harry smokes 5 to 10 cigarettes a day.

Subjects saw the following paragraph for the desirable occurrence:

Harry's roommate Tom is a junior in economics. Tom thinks he would like to go into banking someday but he sometimes thinks about going into politics. He works hard but has a decent social life. He occasionally stays out late and has trouble getting up for classes. He lives in the dorm and eats most of his meals in the student center. His diet is fairly well-balanced. Tom also takes several vitamins with his lunch each day.

The to-be-explained event was then restated following the information on the third page—e.g., "Given the information presented, why do you think Harry got so sick when Tom did not get sick?"—and subjects were asked to "suggest one possible causal explanation."

The scenarios were constructed to include common and distinctive features of differing degrees of causal relevance to the event, specifically: (1) one highly relevant feature that was common to the desirable and undesirable occurrences; (2) three moderately relevant features, one that was common, another that was distinctive for the undesirable occurrence, and a third that was distinctive for the desirable occurrence; and (3) several slightly relevant features, two common, one distinctive for the undesirable occurrence and one distinctive for the desirable occurrence (see Table 1). This mix of features was chosen to provide a broad range of features for subjects to consider and to serve as an indicator of the extent of subjects' search for causal explanations. In particular, a concern of the present study was that subjects would not feature match across the two occurrences but rather would limit their search to features of one occurrence or the other without regard to features of the contrasting occurrence. For example, subjects might limit their search to features of the occurrence that was presented first because these features are in closer proximity to the causal question. Subjects might instead limit their search to features of the occurrence

TABLE I
 MEANS AND STANDARD DEVIATIONS FOR RATINGS OF CAUSAL RELEVANCE OF COMMON AND
 DISTINCTIVE FEATURES FOR THE ILLNESS AND OINTMENT SCENARIOS

Illness scenario		
Common features		Rating
Occasionally staying out so late that it's difficult to get up for classes	5.35 (1.31) ^a	Highly relevant
Living in a dorm	4.40 (1.80)	Moderately relevant
Having a decent social life	3.20 (1.44)	Slightly relevant
Eating most meals at the student center	3.15 (1.04)	Slightly relevant
Distinctive features—undesirable occurrence		
Smoking 5 to 10 cigarettes per day	4.15 (1.63)	Moderately relevant
Hoping to go to law school	1.85 (1.50)	Slightly relevant
Distinctive features—desirable occurrence		
Taking vitamins	3.90 (1.12)	Moderately relevant
Hoping to go into banking or politics	1.35 (.59)	Slightly relevant
Ointment scenario		
Common features		Rating
Being packaged in a metal tube	5.20 (1.70)	Highly relevant
Having a strong smell of camphor	4.00 (1.75)	Moderately relevant
Being recommended by the pharmacist	2.70 (1.71)	Slightly relevant
Being popular with athletes	1.70 (.92)	Slightly relevant
Distinctive features—undesirable occurrence		
Containing methyl salicylate	4.10 (1.20)	Moderately relevant
Being "Brand A"	1.70 (1.49)	Slightly relevant
Distinctive features—desirable occurrence		
Containing aloe vera	3.80 (1.54)	Moderately relevant
Being "Brand B"	2.10 (1.71)	Slightly relevant

^a Numbers in parentheses indicate standard deviations. Ratings are based on a sample of 20 subjects.

that was presented second perhaps because these features would be more available to subjects in rendering their judgments.

Previous research on causal judgments indicates that people prefer causal explanations that are based on distinctive versus common features (McGill, 1989) and, all other factors held constant, features of greater causal relevance (Einhorn & Hogarth, 1983). Thus, features in the present study were chosen so that the most relevant features were common to the desirable and undesirable occurrences, while distinctive features were chosen to be somewhat less relevant to the event. By examining subjects' responses it is therefore possible to infer the extent of subjects' search for causal explanations. Specifically, if subjects were to limit their search to features of the just one occurrence, they would be more likely to provide causal explanations based on the highly relevant common features. By contrast, if subjects were to select features by comparing across occurrences, they would be more likely to base their explanations on moderately relevant but distinctive features. The effect of direction of comparison would be indicated secondarily by greater preference for explanations based on the distinctive feature of the occurrence that was the focus of the comparison.

A pilot study was performed to assess the a priori causal relevance of features included in the scenarios. Twenty subjects were recruited in the student lounges of the libraries of

Northwestern University and the National College of Education. Subjects were asked if they would be willing to fill out a short questionnaire that "asked their opinion on some general issues." Subjects who agreed were then given the questionnaire that asked them to "please rate the causal relevance of each of the following with respect to an undergraduate getting a cold" and also to rate the causal relevance of features related "to a 'heat' ointment (for sore muscles) that is left on a hot radiator later causing a burning sensation when applied to the skin." Subjects were presented a list of features and asked to mark their responses on a 1 ("not at all relevant") to 7 ("extremely relevant") scale. The features rated and the associated means and standard deviations are shown in Table 1.¹ Table 1 also designates features as "highly," "moderately," and "slightly" relevant based on their ratings. These labels are provided for ease of exposition in describing results of the pilot study and experiments.

As can be seen from Table 1, subjects rated the highly relevant common feature for each scenario significantly more relevant than any other common or distinctive feature (for all pairs, $p < .05$, paired t tests). In addition, subjects rated the moderately relevant common feature, the moderately relevant distinctive feature for the desirable occurrence, and the moderately relevant distinctive feature for the undesirable occurrence roughly the same level of causal relevance (for each scenario, $p > .20$). Further, subjects rated the moderately relevant distinctive feature for each occurrence significantly more relevant than the slightly relevant distinctive feature (for all pairs, $p < .05$). Thus, results of the pilot study indicate that the common and distinctive features differed in causal relevance as intended.

Design and procedure. The experimental design involved scenario (illness, ointment) as a within-subjects factor and information presentation order (undesirable occurrence first, desirable occurrence first) as a between-subjects factor. Information presentation order was manipulated by reversing the paragraphs on the second and third pages. Thus, each subject provided an explanation for the illness scenario and the ointment scenario, and information presentation order for the target episode and the contrasting background instance—i.e., undesirable occurrence first versus desirable occurrence first—was the same for both scenarios. Subjects were randomly assigned to conditions. The order in which scenarios were presented was counterbalanced.

Subjects were given the packet of experimental stimuli and were told to turn to subsequent pages only when instructed to do so. They were given 15 s to review the information presented on each page and 20 s to write a causal explanation. Subjects were instructed not to review information on earlier pages. Results from a pretest study involving six subjects who were enrolled in the same undergraduate program as subjects who participated in the main study indicated that a reading time of 15 s allowed subjects to read the information presented on each page at least twice. Six additional subjects were asked to read the information presented on each page for as long as they liked and then to indicate when they were satisfied that they had reviewed the information carefully. Reading times for these subjects ranged from 9 to 19 s ($M = 13.33$). On the basis of these results a reading time of 15 s was deemed adequate. Although a longer reading time may have allowed subjects to review the information more carefully, a longer reading time also presented the risk that subjects would become distracted or even disruptive. The latter was a concern because the experiment was run in class. Because results for the pilot studies indicated that 15 s was adequate for subjects to review the information carefully, it was assumed that results for the experiment would not have differed had subjects been

¹ Subjects in the pilot study actually rated the negation of the distinctive features of the desirable occurrence as shown in Table 1. For example, subjects rated the relevance of "not taking vitamins" with respect to an undergraduate getting a severe cold.

TABLE 2
RESULTS FOR EXPERIMENT 1: CAUSAL EXPLANATIONS CATEGORIZED BY INFORMATION
PRESENTATION ORDER AND EXPLANATION BASE

Information presentation order	Explanation base		
	Distinctive feature of the desirable occurrence ^a	Distinctive feature of the undesirable occurrence ^a	Other ^b
Illness scenario			
Desirable occurrence first	14	2	2
Undesirable occurrence first	5	10	3
Ointment scenario			
Desirable occurrence first	13	3	2
Undesirable occurrence first	1	12	5

^a Only explanations based on the moderately relevant distinctive features as shown in Table 1 were included in these categories.

^b Explanations based on common features or slightly relevant distinctive features were categorized as "other."

allowed to review the information for as long as they liked. Four studies are needed to evaluate this assumption, however.

Results and Discussion

Table 2 displays subjects' responses categorized by information presentation order (desirable occurrence first, undesirable occurrence first) and whether the explanations were based on (a) the moderately relevant distinctive feature of the desirable occurrence, (b) the moderately relevant distinctive feature of the undesirable occurrence, or (c) some other common or distinctive feature. Classifications were made by the author and one independent judge by comparing subjects' responses to a list of features like that presented in Table 1. In almost all cases, the explanations that subjects provided were simple statements regarding the presence or absence of features—for example, "He got sick because he smokes" and "The bad ointment contained methyl salicylate." As a result, classifications were relatively easy to make and there were no disagreements between the author and the judge. Only two subjects provided explanations that involved combinations of features—for example, "Harry was sick because he stays out too late and smokes too much." The low incidence of compound explanations may be attributed to the limited time subjects were given to write their explanations (20 s) or to the instructions for the experiment, which specified that subjects were to suggest *one* possible causal explanation. Compound explanations were classified as "other" for the present analysis.

Responses were first analyzed to assess the extent of subjects' search for causal explanations. For both scenarios, subjects overwhelmingly provided explanations based on the moderately relevant distinctive feature of either the desirable or undesirable occurrence (for the illness scenario, $t(35) = 4.50$, $p < .001$; for the ointment scenario, $t(35) = 3.75$, $p < .001$). Subjects appeared therefore to have engaged in a fairly thorough search across occurrences, having chosen distinctive features over common features of greater or equal causal relevance and over other distinctive features of lesser relevance.

Responses were then analyzed to assess the effect of direction of comparison. As predicted, subjects who were presented the causal question in advance were more likely to base their explanations on the distinctive feature belonging to the occurrence that was described first (for the illness scenario, $z = 2.87$, $p < .01$; for the ointment scenario, $z = 3.30$, $p < .01$, log-linear analysis, "other" category excluded). Thus, when the causal question was specified in advance, subjects appeared to focus on features of the occurrence presented first and to search for these features in the occurrence presented second. Experiment 2 was designed to evaluate the direction of comparison adopted by subjects who did not anticipate the causal question.

EXPERIMENT 2

Method

Subjects. Subjects were 44 New York University undergraduates enrolled in an introductory marketing course. The experiment was run in class. Subjects who participated in Experiment 2 were enrolled in a section of the course different than that of subjects who participated in Experiment 1.

Stimuli. Stimuli were the same as in Experiment 1 with the exception that subjects were not informed of the causal reasoning task before information about the desirable and undesirable occurrences was presented. Rather, the first page of the stimuli instructed subjects to "consider the information on the following pages carefully." Before the experimental materials were distributed, subjects were told that the study concerned "their ability to process information."

Design and procedure. Design and procedure were the same as in Experiment 1 with the exception that scenario (illness, ointment) was a between-subjects factor. Subjects were presented only one scenario to avoid the possibility that subjects would anticipate the causal question for the second scenario.

Results and Discussion

Table 3 displays subjects' responses categorized by information presentation order and explanation base. Classification procedures were the same as those described for Experiment 1. Again there was no disagreement between the author and the independent judge regarding classification of responses. No subjects in Experiment 2 provided explanations that were based on more than one feature.

As in Experiment 1, subjects overwhelmingly provided explanations

TABLE 3
RESULTS FOR EXPERIMENT 2: CAUSAL EXPLANATIONS CATEGORIZED BY INFORMATION
PRESENTATION ORDER AND EXPLANATION BASE

Information presentation order	Explanation Base		
	Distinctive feature of the desirable occurrence ^a	Distinctive feature of the undesirable occurrence ^a	Other ^b
Illness scenario			
Desirable occurrence first	2	7	2
Undesirable occurrence first	9	0	2
Ointment scenario			
Desirable occurrence first	1	8	2
Undesirable occurrence first	7	1	3

^a Only explanations based on the moderately relevant distinctive features as shown in Table 1 were included in these categories.

^b Explanations based on common features or slightly relevant distinctive features were categorized as "other."

based on the moderately relevant distinctive features, indicating that they did not restrict their search to one occurrence but rather feature matched across occurrences (for the illness scenario, $t(21) = 2.89$, $p < .005$; for the ointment scenario, $t(21) = 2.45$, $p < .05$). As predicted for Experiment 2, however, subjects who were presented the causal question after the fact were more likely to base their explanations on the distinctive feature belonging to the occurrence that was presented second (for the illness scenario, $z = 2.77$, $p < .01$; for the ointment scenario, $z = 2.68$, $p < .01$, log-linear analysis, "other" category excluded). Thus, when the causal question was specified after the fact, subjects appeared to focus on features of the more recently presented occurrence and to look for these in the occurrence presented earlier.

As discussed above, a possible alternative explanation for the results of Experiments 1 and 2 is that subjects limited their search for causal explanations to features of one occurrence or the other depending on the position of the causal question. According to this view, differences in causal explanations in Experiments 1 and 2 did not result from the direction of comparison between occurrences but rather from which occurrence constituted the domain of subjects' search—i.e., subjects may have limited their search to features of the occurrence that was presented first when the to-be-explained event was specified in advance (a primacy effect) and the occurrence that was presented second when the to-be-explained event was specified after the fact (a recency effect). However, this explanation cannot account for subjects' preference for moderately

relevant *distinctive* features over common features of greater or equal causal relevance. If subjects were limiting their search to features of one occurrence or the other, a more likely hypothesis is that subjects would select the feature of the greatest causal relevance without regard to whether the feature was common or distinctive. Because the scenarios used in Experiments 1 and 2 were constructed such that features of greater causal relevance were common to the desirable and undesirable occurrences, restricted search to features of one occurrence or the other would be indicated by preference for explanations based on common versus distinctive features (see Table 1).

It might be argued, however, that the causal relevance of the common and distinctive features differed when the features were considered in the context of the scenarios. In particular, the features rated "moderately relevant" in the pilot study might have been perceived as highly relevant in the actual scenarios. Thus, subjects could have limited their search to just one occurrence and nevertheless based their explanations on the "moderately relevant" distinctive features.

Experiment 3 was designed to evaluate this alternative explanation for the results of Experiments 1 and 2. In Experiment 3, subjects were provided information concerning either the desirable or the undesirable occurrence—but not both—and asked to suggest a possible causal explanation. Thus, subjects in Experiment 3 were forced to limit their search to just one occurrence. If subjects in this experiment were also to base their causal explanations on moderately relevant *distinctive* features, this result would support the contention that the effect for order of presentation in Experiments 1 and 2 resulted not from direction of comparison between occurrences but rather from which occurrence constituted the domain of subjects' search. By contrast, if subjects were to base their causal explanations on *common* features, this result would indicate that a hypothesis based on limited domain of search is not adequate to account for the results of Experiments 1 and 2.

Before considering the third experiment, it should be noted that description of features as "common" or "distinctive" for Experiment 3 is potentially misleading. Subjects in Experiment 3 were provided information on only one occurrence. Without a reference case, it is impossible to designate particular features as common or distinctive. Nevertheless, these terms are retained in the description of Experiment 3 for ease of exposition, especially in comparing results for Experiment 3 with results for Experiments 1 and 2. The reader may wish to keep in mind, however, that subjects in Experiment 3 were able to evaluate features only on degree of causal relevance and not in terms of feature distinctiveness.

TABLE 4
RESULTS FOR EXPERIMENT 3: CAUSAL EXPLANATION CATEGORIZED BY INFORMATION PROVIDED AND FEATURE DISTINCTIVENESS

Information provided	Feature distinctiveness	
	Common feature	Distinctive feature
Desirable occurrence		
Illness scenario	15	3
Ointment scenario	12	6
Undesirable occurrence		
Illness scenario	13	5
Ointment scenario	13	5

EXPERIMENT 3

Method

Subjects, stimuli, procedure, and design. Thirty-six subjects were recruited in the student lounge of the J. L. Kellogg Graduate School of Management at Northwestern University and asked to provide causal explanations for the illness and ointment scenarios described for Experiments 1 and 2. However, in contrast to the preceding experiments, subjects in Experiment 3 were provided detailed information on only one occurrence. This reduction of information was accomplished by removing the paragraph of information on the target episode or the contrasting background instance from the stimuli for Experiment 1. Subjects for Experiment 3 were provided the same opening paragraph as subjects for the first experiment. (An example of the opening paragraph for the illness scenario was presented earlier in the description of the stimuli for Experiment 1.) This paragraph introduced the causal question and made specific reference to both the target episode (e.g., Harry's illness) and the contrasting background instance (e.g., Tom's continued good health). After reading this paragraph, subjects were instructed to consider the information on the following page. The experimental design was such that half the subjects were given the paragraph of information on the desirable occurrence while the remaining subjects were given the paragraph of information on the undesirable occurrence.

Results and Discussion

Table 4 displays subjects' responses categorized by the information provided (on the desirable versus undesirable occurrence) and whether explanations were based on common versus distinctive features. Classifications were made by the author. Four subjects in this experiment provided explanations that were based on two features. For three subjects, the specification of a compound explanation was not an issue with respect to classification because the features on which the explanation was based were both common. One subject, however, provided an explanation that was based on one common and one distinctive feature. This response was classified as distinctive to be conservative with respect to the hypotheses of the study.

For both scenarios, subjects were more likely to base their explanations

on features common to the two occurrences. For the illness scenario, 15 of 18 subjects who are given information on the desirable occurrence and 13 of 18 subjects who were given information on the undesirable occurrence based their explanations on common features ($t(17) = 2.75$, $p < .01$, and $t(17) = 1.85$, $p < .05$, respectively). For the ointment scenario, 12 of 18 subjects who were provided information on the desirable occurrence and 13 of 18 subjects who were given information on the undesirable occurrence based their explanations on common features, although the effect was only marginally significant for subjects who were given information on the desirable occurrence (for subjects who were given information on the desirable occurrence, $t(17) = 1.41$, $p < .08$; for subjects who were given information on the undesirable occurrence, $t(17) = 1.85$, $p < .05$).² Data from Experiment 3 indicate, therefore, that the results of Experiments 1 and 2 cannot be accounted for by the suggestion that subjects limited their search to one occurrence versus the other depending on the position of the causal question. Subjects in Experiments 1 and 2 based their explanations on distinctive features of the occurrence that was the focus of the comparison. Results of Experiment 3 demonstrate, however, that when subjects were forced to limit their search to just one occurrence they were more likely to base their explanations on highly relevant but common features rather than on distinctive features of lesser causal relevance.

GENERAL DISCUSSION

Experiments 1 and 2 demonstrate that selection of a causal explanation depends not only on the causal background adopted but also on the direction of comparison between the target episode and the causal background. Results of Experiment 3 further support the role of direction of comparison in judgments of causation by demonstrating that the results of Experiments 1 and 2 cannot be accounted for by the suggestion that subjects limited their search to features of just one occurrence. Exper-

² Subjects who were given information on the undesirable occurrence based their explanations on common features different than those of subjects who were given information on the desirable occurrence. Specifically, subjects who were given information on the undesirable occurrence based their explanations on highly and moderately relevant common features (see Table 1). For example, for the illness scenario, subjects who were given information on the student who developed the severe cold explained the illness by noting that the student frequently stayed out so late that he had trouble getting up for classes. By contrast, subjects who were given information on the desirable occurrence based their explanations on slightly relevant common features. This may have occurred because features that were not very relevant to the to-be-explained event when the undesirable occurrence was the focus of the inquiry may have appeared highly relevant when the desirable occurrence was the focus of the inquiry. For example, for the illness scenario, eating [a balanced diet] at the student center may have appeared irrelevant to getting sick but quite relevant to staying well.

iments 1 and 2 demonstrate further that direction of comparison may depend on two factors: (1) the order in which subjects examine information about the target and background, and (2) whether they review the information with the causal question in mind or whether the question is specified after the fact. In Experiment 1, the to-be-explained event was specified before subjects were presented information on the target episode and contrasting background instance. For this experiment, a majority of subjects based their causal explanations on distinctive features of the occurrence presented first, suggesting that they compared features of the first occurrence to features of the second in an effort to identify distinctive features. By contrast, subjects in Experiment 2 reviewed information on the target episode and contrasting background instance before encountering the causal question. For this experiment, a majority of subjects based their explanations on distinctive features of the occurrence presented second, suggesting that they compared features of the second occurrence to features of the first.

For both Experiments 1 and 2, subjects who focused on the undesirable occurrence (being sick, producing a burning sensation) based their explanations on distinctive features *present* for the occurrence (smoking, containing methyl salicylate). By contrast, subjects who focused on the desirable occurrence based their explanations on the *absence* of features (not taking vitamins, not containing aloe vera). This difference in causal explanations may imply different approaches to avoiding the problem in the future. For example, subjects who focused on the undesirable occurrence may recommend removing features—e.g., the sick man should quit smoking; the ointment should be made without methyl salicylate. By contrast, subjects who focused on the desirable occurrence may recommend the addition of features—e.g., the sick man should take vitamins, the ointment should be made with aloe vera.

A similar analysis can be made for differences in public policy decisions (cf. Belk, Painter, & Semenik, 1981; Belk & Painter, 1983). For example, consider two educators both of whom are familiar with a pair of teenage girls (best friends, perhaps), one pregnant, the other not. Imagine that the first educator initiates causal reasoning only after becoming aware of the second girl's pregnancy. Results of Experiment 2 indicate that this educator is likely to base his/her explanation for the unwanted pregnancy on a distinctive feature of the pregnant teenager. For example, the educator may blame the girl's pregnancy on development of a serious boyfriend or on having been raised by "permissive" parents. Imagine, by contrast, that the second educator treats the two girls as case studies for understanding the problem of teenage pregnancy—i.e., the second educator specifies the causal question before reviewing information on the two girls. Imagine further that this educator examines information, first, on the girl who is not pregnant and then on the girl who is pregnant.

Results of Experiment I indicate that this second educator is likely to base his/her explanation for the unwanted pregnancy on a distinctive feature of the girl who is not pregnant. For example, the educator may note that the girl who is not pregnant has a positive self-image and well-developed goals for the future.

The different explanations offered by the two educators may influence their policies with respect to teenage pregnancy. The first educator who focused on the undesirable occurrence may advocate, for example, restrictions on dating and, in general, strict upbringing for children. The second educator who focused on the desirable occurrence may have more positive recommendations, for example, career counseling targeted specifically to teenage girls and a program of extracurricular activities designed to enhance self-image. Hence, people with nearly identical information may develop different causal explanations as well as different political agenda by changing the direction of comparison between occurrences. Future research should examine further this relationship between causal explanations and preferences for future policies and solutions.

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